Work Order ID 74584

Monday, October 03, 2011 11:22:13 AM

U/R

Item ID: D350-748-141TRN **Accept** **Setup Start** **Stop**

Revision ID: U/R

Item Name: Crosstube Turning Detail

Start Date: 10/3/2011 **Start Qty:** 1.00 **Cust Item ID:**

Required Date: 10/7/2011 **Req'd Qty:** 1.00 **Customer:**

Reference:

Run Start **Stop**

Approvals: **Process Plan:** M.L.J **Date:** 11/10/03 **Tooling:** _____ **Date:** _____

QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	**Revision Nbr**								
D350-748-141	F U/R OK 11.10.03								
100		0.00							
Mori Seiki	MORI SEIKI CNC LATHE LARGE					1	0		
Mori Seiki CNC Lathe Large	**Memo**	0.00							
	1-Fill tube with sand & install plugs on both ends as per Folio FA648 2-Turn first side as per Folio FA648 3- File transition lines smooth. FOLIO REV: AA DWG REV: F								M.L 11/11/1
110	QC1- Inspect dimensions to dimension sheet	0.00							
QC						1	0		
Quality Control	**Memo**	0.00							M.L 11/11/1

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Work Order ID 74584

Monday, October 03, 2011 11:22:13 AM

Item ID: D350-748-141TRN
Revision ID: U/R
Item Name: Crosstube Turning Detail
Start Date: 10/3/2011 **Start Qty:** 1.00
Required Date: 10/7/2011 **Req'd Qty:** 1.00
Reference:

Accept **Setup Start** **Stop**

Cust Item ID:
Customer:

Run Start **Stop**

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
120	MORI SEIKI CNC LATHE LARGE	0.00				1	Ø		
Mori Seiki	**Memo**	0.00							
Mori Seiki CNC Lathe Large	1-Turn second side as per Folio FA648 2- File transition lines smooth. 3-Scribe Part & Batch as per Dwg D350-748-141 FOLIO REV: AA DWG REV: E					MM.L 11/11/1			
130	QC1- Inspect dimensions to dimension sheet	0.00				1	Ø		
QC	**Memo**	0.00							
Quality Control						MM.L 11/11/1			
140	QC8- Inspect parts - second check	0.00							
QC	**Memo**	0.00				11-11-3			
Quality Control									

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Work Order ID 74584

Monday, October 03, 2011 11:22:13 AM

Item ID: D350-748-141TRN
Revision ID: U/R
Item Name: Crosstube Turning Detail
Start Date: 10/3/2011 **Start Qty:** 1.00
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Reference:

Accept

Setup Start
Stop

Cust Item ID:
Customer:

Run Start
Stop

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150 Crosstubes Crosstubes	Large Fab **Memo** Grind machining marks	0.00 0.00	MO	11/11/03					
160 Outsource1 Outsource process - Heat Treat	Outsource process - Heat Treat **Memo** Issue P/O: 15376 Heat Treat to min 180 KSI As per Dwg D350-748-141 (MIL-T-6736 OR AMS 2759-1C) Sand Blast tube after Heat Treat Possibe Supplier: Vac Aero Ensure Certificate of Conformity is attached	0.00 0.00					✓ 11-11-04		
170 Packaging Packaging	Receive & Inspect for Damage & Mat'l Certs **Memo** Ensure certificate of conformaty is attached	0.00 0.00							

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
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Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

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NOTE: Date & initial all entries

Work Order ID 74584

Monday, October 03, 2011 11:22:13 AM

Item ID: D350-748-141TRN
Revision ID: U/R
Item Name: Crosstube Turning Detail

Start Date: 10/3/2011 **Start Qty:** 1.00
Required Date: 10/7/2011 **Req'd Qty:** 1.00
Reference:

Cust Item ID:
Customer:

Accept **Setup Start** **Stop** **Run Start** **Stop**

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____
QC: _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
180 QC Quality Control	QC6- Inspect dimensions to drawing	0.00							
	Memo	0.00							
190 Packaging Packaging	Packaging	0.00							
	Memo Identify and stock in kanban rack Location: Back hall	0.00							
200 QC Quality Control	QC21- Final Inspection - Work Order Release	0.00							
	Memo	0.00							

8/12/21

AT 11-12-22

11/12/22

11-12-22

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

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			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

Monday, October 03, 2011 11:22:17 AM

Work Order ID: 74584

Parent Item: D350-748-141TRN

Parent Item Name: Crosstube Turning Detail

Start Date: 10/3/2011 **Required Date:** 10/7/2011

Start Qty: 1.00 **Required Qty:** 1.00

Comments: IPP Rev:A New Issue 08-03-06 DD verified by:ec
IPP Rev B Removed polish 08.04.02 EC verified by : DD
IPP Rev C Remove LPS-3 08.06.23 EC verified by DD IPP Rev C
11.02.24 as per dwg rev.F DD verf: JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6015-125 Crosstube Material		Manufactured	No			110	Each	22.0000	1	1			

Location	Loc Qty	Loc Code
HALL	22	
6380	22	

1 MML 11/10/11

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

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			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	74584
Description: Crosstube Assembly (AS350/355 High Fwd)	Part Number:	D350-748-141
Inspection Dwg: D350-748-141 **Rev:** F		Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.244	✓		vern	CWC-08
	2.180	+0.005/-0.000	2.184	✓		"	
	2.180	+0.005/-0.000	2.183	✓		"	
	2.237	+0.005/-0.000	2.240	✓		"	
	2.272	+0.005/-0.000	2.276	✓		"	
	2.306	+0.005/-0.000	2.310	✓		"	
	2.339	+0.007/-0.000	2.346	✓		"	
	2.339	+0.007/-0.000	2.344	✓		"	
	0.062	+/-0.010	.062	✓		vern	CWC-08
	4.26	+/-0.030	4.265	✓		"	
	R0.063	+/-0.010	.063	✓		RG	
	R0.50	+/-0.030	.500	✓		"	
SIDE B	2.240	+0.005/-0.000	2.244	✓		vern	CWC-08
	2.180	+0.005/-0.000	2.184	✓		"	
	2.180	+0.005/-0.000	2.185	✓		"	
	2.237	+0.005/-0.000	2.241	✓		"	
	2.272	+0.005/-0.000	2.277	✓		"	
	2.306	+0.005/-0.000	2.311	✓		"	
	2.339	+0.007/-0.000	2.346	✓		"	
	2.339	+0.007/-0.000	2.346	✓		"	
	0.062	+/-0.010	.062	✓		vern	CWC-08
	4.26	+/-0.030	4.265	✓		"	
	R0.063	+/-0.010	.063	✓		RG	
	R0.50	+/-0.030	.500	✓		"	
	110.27	+/-0.060	110.265	✓		tape	CWC-08

Measured by:		Audited by:		Preliminary Approval:	
Date:	11/11/11	Date:	11-11-3	Date:	

Rev	Date	Change	Revised by	Approved
A	06.11.09	New Issue (P/O D350-748-101)	KJ/JLM	
B	07.10.24	Dwg Rev updated	KJ/EC/DD	
C	11.01.20	Dwg Rev updated	KJ	
D	11.07.26	Tolerance revised for 2.339 dimensions	KJ	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
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Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

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			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Item	Qty -141	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 74584 M.L.J
11/10/03

OK UP 11.10.23 UNDER REVIEW 11.07.12

RELEASED
2011 -01- 18

GENERAL NOTES:

1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115
 FINISHED LENGTH = 110.270±0.06
2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
 CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
 PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
 PAINT OUTSIDE PER DART QSI 005 4.2
3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
4) UNITS: INCHES UNLESS OTHERWISE NOTED.
5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
6) IDENTIFICATION: DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF PER DART QSI 044 6.4 (VIBRATING STYLUS)
7) WEIGHT: 30.45 lbs
8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

REV.	DESCRIPTION	BY	DATE
F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31

DESIGN		DART AEROSPACE LTD	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 1 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23		

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Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

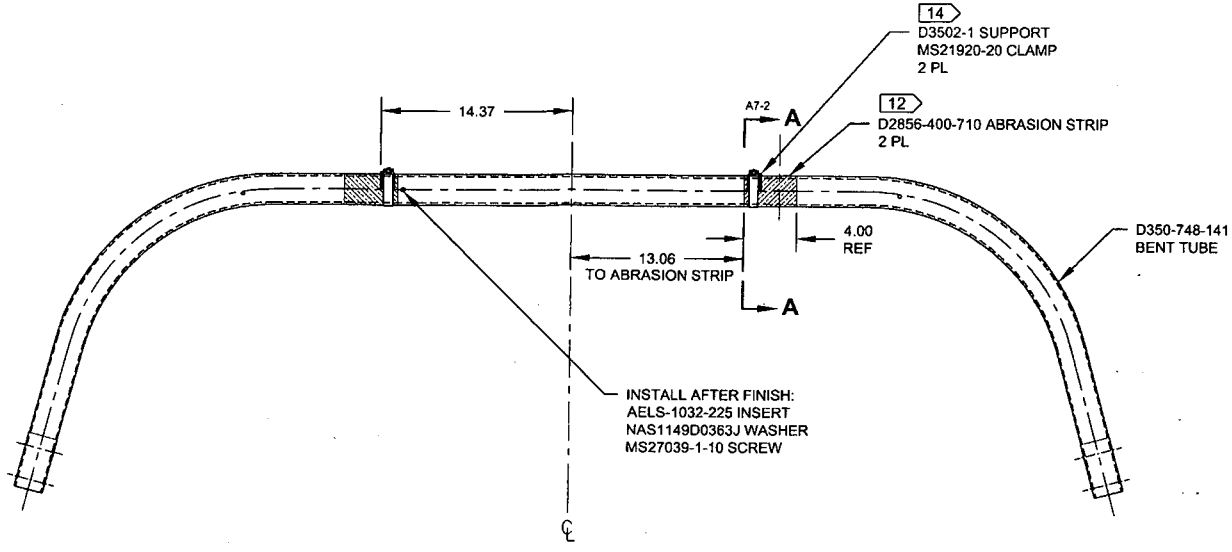
Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

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NOTE: Date & initial all entries

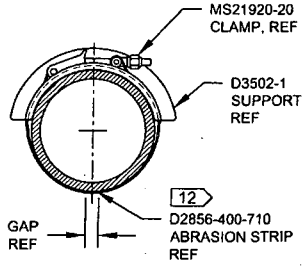
74584



D350-748-141
ASSEMBLY DETAIL

UNDER REVIEW
11.07.11

RELEASED
2011 -01- 18



SECTION A-A D4-2
SCALE 4X

DESIGN		**DART AEROSPACE LTD**	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 2 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23		

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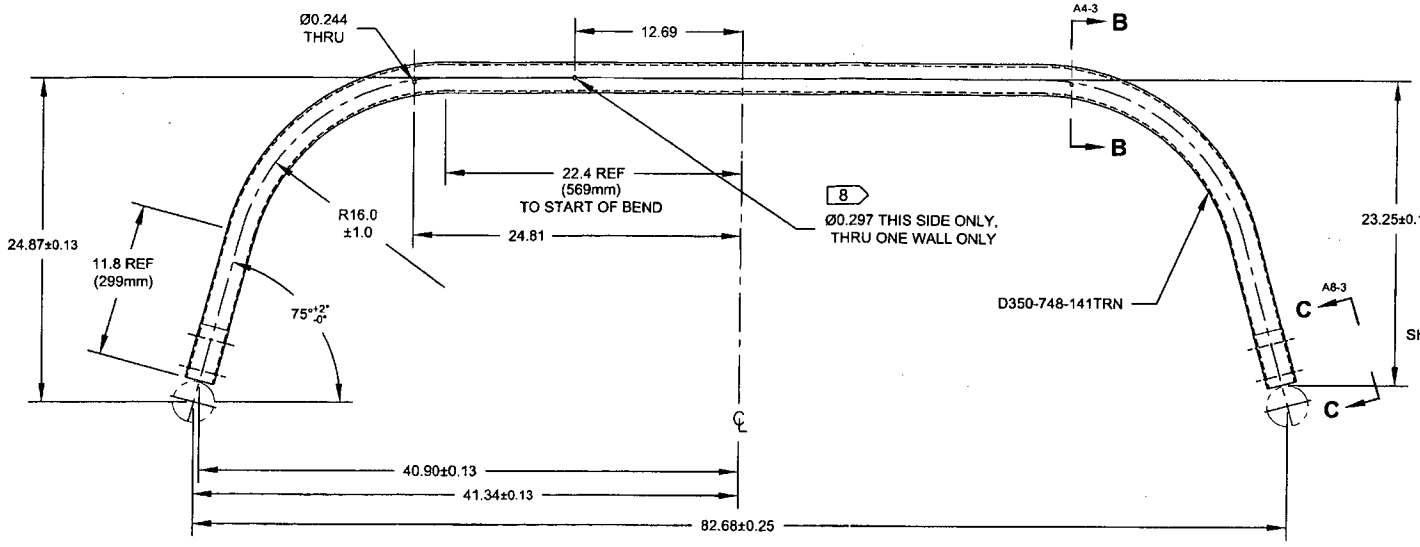
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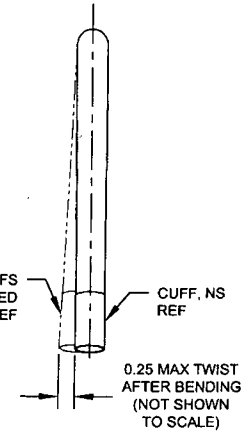
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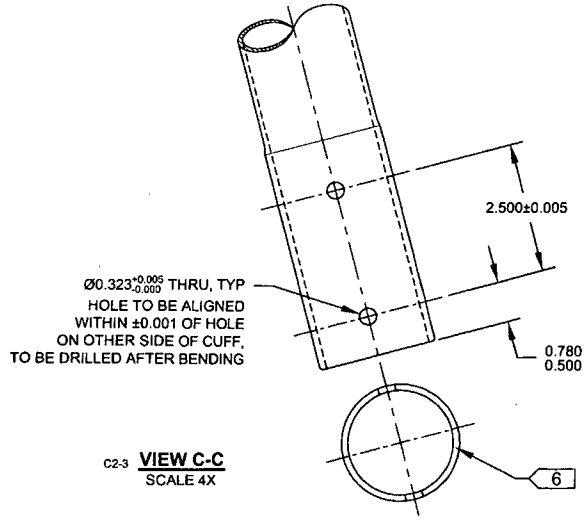
NOTE: Date & initial all entries

74584

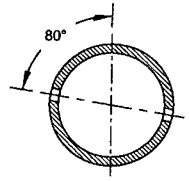




D350-748-141
BENDING AND DRILLING DETAIL 10



C2-3 **VIEW C-C**
SCALE 4X



SECTION B-B D3-3
SCALE 4X

UNDER REVIEW
11.27.12

RELEASED
2011-01-18

DESIGN		**DART AEROSPACE LTD**	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 3 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23		

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Dart Aerospace Ltd

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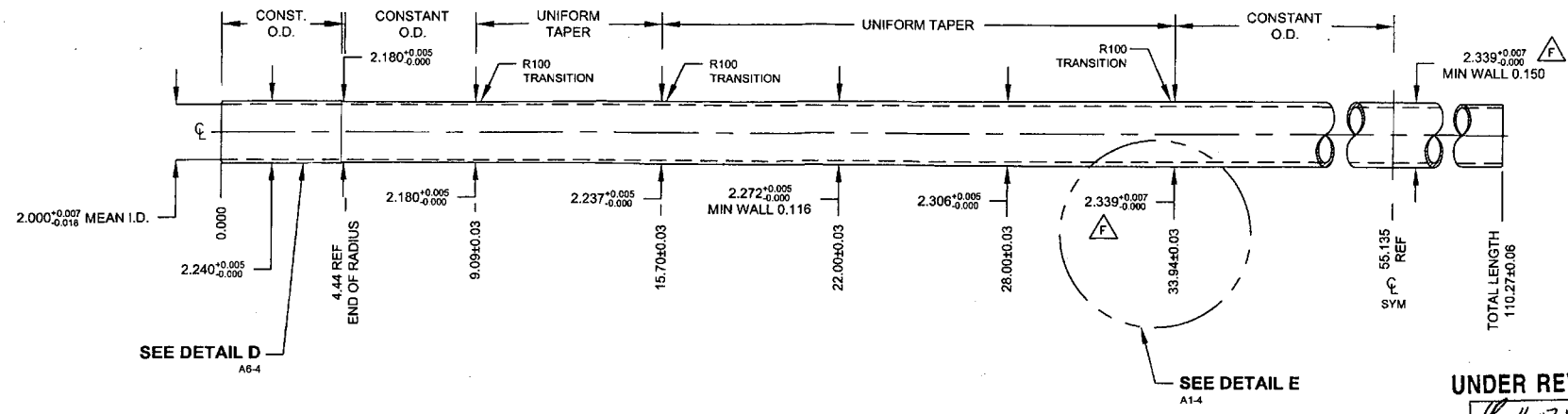
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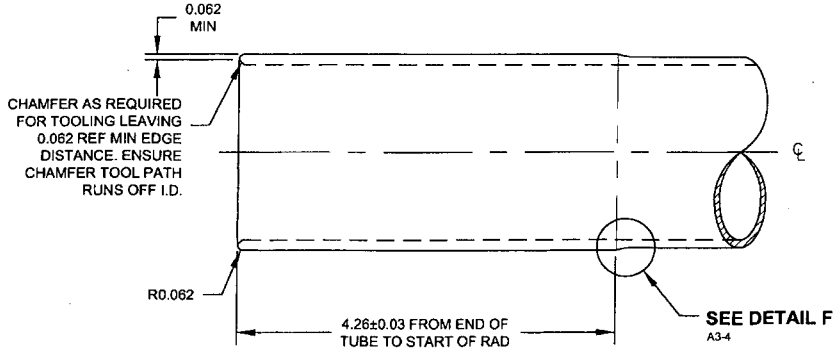
NOTE: Date & initial all entries

74584

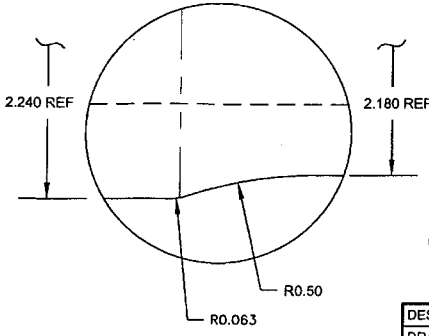


D350-748-141TRN
TURNING DETAIL

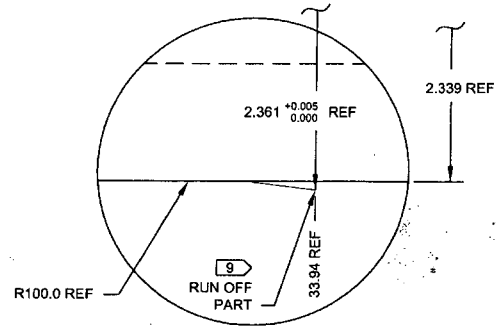
UNDER REVIEW
11.07.12



DETAIL D:
CROSSTUBE CUFF C7-4
SCALE 3X



DETAIL F:
CUFF TRANSITION A5-4
NOT TO SCALE



RELEASED
2011 -01- 18

DETAIL E:
TAPER RUN-OFF C3-4
NOT TO SCALE

DESIGN		**DART AEROSPACE LTD** HAWKESBURY, ONTARIO, CANADA	
DRAWN			
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 4 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23		

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Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

VAC AERO INTERNATIONAL INC.

RELEASE NOTE

GST No. : R105468102

OAK 136092-1

[X] HEAD OFFICE
1371 SPEERS ROAD, OAKVILLE, ONTARIO
CANADA L6L 2X5
TEL: (905) 827-4171 FAX: (905) 827-7489

[] 2009 WYECROFT ROAD, UNIT B
OAKVILLE, ONTARIO
CANADA L6I 6J4
TEL: (905) 827-7377 FAX: (905) 827-1380

[] QUEBEC DIVISION
7450 RUE VÉRITÉ STREET, ST. LAURENT, QUÉBEC
CANADA H4S 1C5
TEL: (514) 334-4240 FAX: (514) 334-6269

12/13/2011
MM / DD / YYYY

1DAR01

SOLD TO: DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

K6A 1K7

SHIP TO : DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

K6A 1K7

DATE SHIPPED	SHIP VIA	F.O.B.
12/13/2011		ORIGIN
CUSTOMER P/O No.	**JOB No.**	**TERMS**
15376		NET 30 DAYS

PART No.	DESCRIPTION	UOM	QTY ORD	QTY SHPD	TEST RESULTS
350-748	241/-141 CROSS TUBE	EA	8	8	

Process Specifications: Procedure: 4353
HEAT TREATED TO 180 KSI MIN. PER AMS 2759-1E
100% HARDNESS CHECKED AS PER ASTM E-18 40-45 HRC
MATERIAL: 4130

P/N D350-748-241
B73376, B73378, B73379, B73377
4 PCS

P/N D350-748-141
B74587, B74585, B74586, B74584
4 PCS

GRIT BLASTED

11/12/21

100% HARDNESS TESTED
@4. 08 PCS.
44/45 HRC 13 Dec/11

NADCAP TH 29 QC

hereby certify that the material covered by this release note has been inspected and tested and conforms to all specifications relevant hereto in accordance with the conditions of the contract / or purchase order.

ON BEHALF OF VAC AERO INTERNATIONAL INC.

NADCAP TH 29 QC

Authorized Q.C. Inspector

INTERTEK AS9100 · ISO 9001

MTI METAL TREATING INSTITUTE

Accredited Nadcap™ Heat Treating - Welding